

09/901930

ABSTRACT

A negative voltage generator is controlled responsive to a word line precharge signal. Voltage fluctuations in a negatively biased word line scheme are reduced by using a kicker circuit to provide a predetermined amount of negative charge to shut off a word line during a precharge operation. The negative voltage generator includes first and second negative charge pumps. The second charge pump is activated responsive to the word line precharge signal. A negative voltage regulator can be used to regulate a negative voltage signal. A level shifter uses two voltage dividers and a differential amplifier to reduce response time, output ripple, and sensitivity to process and temperature variations. A negative voltage regulator cancels ripple from a charge pump to provide a stable negative bias voltage and reduce the amount of charge needed to precharge a word line.

09001930-07001